



# UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

NATIONAL EXPOSURE RESEARCH LABORATORY

HUMAN EXPOSURE & ATMOSPHERIC SCIENCES DIVISION (MD-D205-03)

Research Triangle Park, NC 27711

919-541-3737

Office of  
Research and Development

## LIST OF DESIGNATED REFERENCE AND EQUIVALENT METHODS

**Issue Date: September 12, 2002**

([www.epa.gov/ttn/amtic/criteria.html](http://www.epa.gov/ttn/amtic/criteria.html))

These methods for measuring ambient concentrations of specified air pollutants have been designated as "reference methods" or "equivalent methods" in accordance with Title 40, Part 53 of the Code of Federal Regulations (40 CFR Part 53). Subject to any limitations (e.g., operating range or temperature range) specified in the applicable designation, each method is acceptable for use in state or local air quality surveillance systems under 40 CFR Part 58 unless the applicable designation is subsequently canceled. Automated methods for pollutants other than PM<sub>10</sub> are acceptable for use only at shelter temperatures between 20°C and 30°C and line voltages between 105 and 125 volts unless wider limits are specified in the method description.

Prospective users of the methods listed should note (1) that each method must be used in strict accordance with its associated operation or instruction manual and with applicable quality assurance procedures, and (2) that modification of a method by its vendor or user may cause the pertinent designation to be inapplicable to the method as modified. (See Section 2.8 of Appendix C, 40 CFR Part 58 for approval of modifications to any of these methods by users.)

Further information concerning particular designations may be found in the *Federal Register* notice cited for each method or by writing to the National Exposure Research Laboratory, Human Exposure and Atmospheric Sciences Division (MD-46), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711. Technical information concerning the methods should be obtained by contacting the source listed for each method. Source addresses are listed at the end of the listing of methods, except for the addresses for lead method sources, which are given with the method. New analyzers or PM<sub>10</sub> samplers sold as reference or equivalent methods must carry a label or sticker identifying them as designated methods. For analyzers or PM<sub>10</sub> samplers sold prior to the designation of a method with the same or similar model number, the model number does not necessarily identify an analyzer or sampler as a designated method. Consult the manufacturer or seller to determine if a previously sold analyzer or sampler can be considered a designated method or if it can be upgraded to designation status. Analyzer users who experience operational or other difficulties with a designated analyzer or sampler and are unable to resolve the problem directly with the instrument manufacturer may contact EPA (preferably in writing) at the above address for assistance.

This list will be revised as necessary to reflect any new designations or any cancellation of a designation currently in effect. The most current revision of the list will be available for inspection at EPA's Regional Offices, and copies may be obtained at the Internet site identified above or by writing to the National Exposure Research Laboratory at the address specified above.

### Most Recent Designations

Tisch Environmental Model TE-6070 PM <sub>10</sub> High Volume Sampler	April 02, 2002
BGI Models PQ200-VSCC and PQ200A-VSCC PM <sub>2.5</sub> Sampler	April 02, 2002
R & P Partisol®-FRM Model 2000 PM-2.5 FEM PM <sub>2.5</sub> Sampler	April 02, 2002
R & P Partisol® Model 2000 PM-2.5 FEM PM <sub>2.5</sub> Audit Sampler	April 02, 2002
R & P Partisol®-Plus Model 2025 PM-2.5 FEM PM <sub>2.5</sub> Seq. Sampler	April 02, 2002
Environnement S.A Model AC32M Nitrogen Oxides Analyzer	April 02, 2002
Environnement S.A Model CO12M Carbon Monoxide Analyzer	June 24, 2002
Environnement S.A Model O <sub>3</sub> 42M Ozone Analyzer	June 24, 2002
Environnement S.A Model AF22M Sulfur Dioxide Analyzer	Sept. 12, 2002
Teledyne - Advanced Pollution Instrumentation Model 400E O <sub>3</sub> Analyzer	Sept. 12, 2002

**OZONE****Beckman Model 950A Ozone Analyzer***Automated Reference Method: RFOA-0577-020*

"Beckman Model 950A Ozone Analyzer," operated on a range of 0-0.5 ppm and with the "SLOW" (60 second) response time, with or without any of the following options: Internal Ozone Generator; Computer Adaptor Kit; Pure Ethylene Accessory.

[*Federal Register:* Vol 42, page 28571, 06/03/77]

**Bendix or Combustion Engineering Model 8002 Ozone Analyzer***Automated Reference Method: RFOA-0176-007*

"Bendix or Combustion Engineering Model 8002 Ozone Analyzer", operated on the 0-0.5 ppm range, with a 40 second time constant, with or without any of the following options: Rack Mounting With Chassis Slides; Rack Mounting Without Chassis Slides; Zero And Span Timer; Ethylene/CO<sub>2</sub> Blend Reactant Gas.[*Federal Register:* Vol 41, page 5145, 02/04/76 and Vol 45, page 18474, 03/21/80]

**Columbia Scientific Industries Model 2000 Ozone Meter***Automated Reference Method: RFOA-0279-036*

"Columbia Scientific Industries Model 2000 Ozone Meter," when operated on the 0-0.5 ppm range with either AC or battery power: The BCA 952 battery charger/AC adapter M952-0002 (115V) or M952-0003 (230V) is required for AC operation; an internal battery M952-0006 or 12 volt external battery is required for portable non-AC powered operation.

[*Federal Register:* Vol 44, page 10429, 02/20/79]

**Dasibi Models 1003-AH, 1003-PC, or 1003-RS Ozone Analyzers***Automated Equivalent Method: EQOA-0577-019*

"Dasibi Model 1003-AH, 1003-PC, or 1003-RS Ozone Analyzer," operated on a range of either 0-0.5 or 0-1.0 ppm, with or without any of the following options: Adjustable Alarm; Aluminum Coated Absorption Tubes, Integrated Output; Vycor-Jacketed U.V. Source Lamp; BCD Digital Output; Rack Mounting Ears And Slides; 0-10 mV, 0-100 mV, 0-1 V, Or 0-10 V; Glass (Pyrex) Absorption Tubes; Teflon-based Solenoid Valve; Analog Output.

[*Federal Register:* Vol 42, page 28571, 06/03/77]

**Dasibi Models 1008-AH, 1008-PC, or 1008-RS Ozone Analyzers***Automated Equivalent Method: EQOA-0383-056*

"Dasibi Model 1008-AH, 1008-PC, or 1008-RS Ozone Analyzer," operated on a range of either 0-0.5 or 0-1.0 ppm, with or without any of the following options: Aluminum Coated Absorption Tubes; BCD Digital Output; RS232 Interface; Glass (Pyrex) Absorption Tubes; Vycor-Jacketed U.V. Source Lamp; Ozone Generator; Teflon-based Solenoid Valve; Photometer Flow Restrictor (2 LPM); 4-20 mA, Isolated, Or Dual Analog Outputs; Rack Mounting Brackets Or Slides; 20 Second Update Software.

[*Federal Register:* Vol 48, page 10126, 03/10/83]

**DKK-TOA Corp. Model GUX-113E Ozone Analyzer***Automated Equivalent Method: EQOA-0200-134*

"DKK-TOA Corporation Model GUX-113E Ozone Analyzer," operated at any temperature in the range of 15° C to 35° C, on any of the following measurement ranges: 0-0.100 ppm<sup>1</sup>, 0-0.200 ppm<sup>1</sup>, 0-0.5 ppm, or 0-1.000 ppm, and with or without the optional Internal Ozone Generator.<sup>2</sup>

[*Federal Register:* Vol 65, page 11308, 03/02/00]

**Environics Series 300 Ozone Analyzer***Automated Equivalent Method: EQOA-0990-078*

"Environics Series 300 Computerized Ozone Analyzer," operated on the 0-0.5 ppm range, with the following parameters entered into the analyzer's computer system: Absorption Coefficient = 308 ± 4; Flush Time = 3; Integration Factor = 1; Offset Adjustment = 0.025 ppm; Ozone Average Time = 4; Signal Average = 0; Temp/Press Correction = On; and with or without the RS-232 Serial Data Interface.

[*Federal Register:* Vol 55, page 38386, 09/18/90]

**Environnement S.A. Model O<sub>3</sub>41M UV Ozone Analyzer***Automated Equivalent Method: EQOA-0895-105*

"Environnement S.A. Model O<sub>3</sub>41M UV Photometric Ozone Analyzer," operated on a full scale range of 0 - 500 ppb, at any temperature in the range of 15 °C to 35 °C, with the response time set to 50 seconds, and with or without any of the following options:<sup>2</sup> Internal Ozone Generator; Span External Control; RS232-422 Serial Interface; Internal Printer.

[*Federal Register:* Vol. 60, page 39382, 08/02/95]

**Environnement S.A. Model O<sub>3</sub>42M UV Ozone Analyzer***Automated Equivalent Method: EQOA-0206-148*

"Environnement S.A. Model O<sub>3</sub>42M UV Photometric Ozone Analyzer," operated with a full scale range of 0 - 500 ppb, at any temperature in the range of 10 °C to 35 °C, with a 5-micron PTFE sample particulate filter, with response time setting of 11 (Automatic response time), and with or without any of the following options:<sup>2</sup> c) Internal ozone generator, d) Span external control (zero/span solenoid valve).

[*Federal Register:* Vol. 67, page 42557, 06/24/02]

**Environnement S.A. SANOA Multigas Longpath Monitoring System***Automated Equivalent Method: EQOA-0400-137*

"Environnement S.A. Model SANOA Multigas Longpath Air Quality Monitoring System, consisting of a receiver, one or more projectors, interface unit, a user-provided control unit computer running the SANOA VisionAIR software, and associated incidental equipment; configured for measuring O<sub>3</sub>, with the temperature control and internal calibration cell options installed, operated with a measurement range of 0 to 0.5 ppm, over an installed monitoring path length of between 27 and 500 meters, within an ambient air temperature range of -30 to +45°C, with a measurement (integrating) time of 180 seconds, and with or without external temperature and barometric pressure sensors or any of the following options: external (meteo) input connection, series 1M bus connection, OGR type projector, analog outputs. A high-concentration ozone generator, part # 80-231-03, or the SONIMIX 7121B calibration system is recommended for calibration or accuracy auditing

[Federal Register: Vol 65, page 26603, 05/08/00]

**Horiba Instruments Models APOA-360 and APOA-360-CE Ozone Monitor Automated Equivalent Method: EQOA-0196-112**

"Horiba Instruments, Inc. Model APOA-360 or APOA-360-CE Ambient Ozone Monitor," operated with a full scale range of 0 - 0.50 ppm, at any temperature in the range of 10°C to 40°C, with a Line Setting of "MEASURE", and an Analog Output of "MOMENTARY VALUE", and with or without any of the following options:<sup>2</sup> 1) Rack Mounting Plate and Side Rails 2) RS-232 Communications Port, and 3) Optional Internal Zero/Span Check

[Federal Register: Vol. 61, page 11404, 03/20/96]

**McMillan (MEC) Models 1100-1, 1100-2, and 1100-3 Ozone Meters**

"MEC Model 1100-1 Ozone Meter,"

"MEC Model 1100-2 Ozone Meter,"

"MEC Model 1100-3 Ozone Meter,"

operated on a 0-0.5 ppm range, with or without any of the following options: 0011 Rack Mounting Ears; 0026 Alarm Set Feature; 0012 Instrument Bail; 0033 Local-Remote Sample; Zero, Span Kit Blend Feature; 0016 Chassis Slide Kit; 0040 Ethylene/CO<sub>2</sub>.

[Federal Register: Vol 41, page 46647, 10/22/76 and Vol 42, page 30235, 06/13/77]

**Meloy Model OA325-2R Ozone Analyzer**

*Automated Reference Method: RFOA-1075-003*

"Meloy Model OA325-2R Ozone Analyzer," operated with a scale range of 0-0.5 ppm, with or without any of the following options: 0-4 Output Booster Amplifier; 0-18 Rack Mount Conversion; 0-18A Rack Mount Conversion.

[Federal Register: Vol 40, page 54856, 11/26/75]

**Meloy Model OA350-2R Ozone Analyzer**

*Automated Reference Method: RFOA-1075-004*

"Meloy Model OA350-2R Ozone Analyzer," operated with a scale range of 0-0.5 ppm, with or without any of the following options: 0-2 Automatic Zero And Span; 0-3 Remote Control Zero And Span; 0-4 Output Booster Amplifier; 0-18 Rack Mount Conversion; 0-18A Rack Mount Conversion.

[Federal Register: Vol 40, page 54856, 11/26/75]

**Monitor Labs Model 8410E Ozone Analyzer**

*Automated Reference Method: RFOA-1176-017*

"Monitor Labs Model 8410E Ozone Analyzer," operated on a range of 0-0.5 ppm with a time constant setting of 5 seconds, with or without any of the following options: DO Status Outputs; ER Ethylene Regulator Assembly; V TFE Zero/Span Valves; TF TFE Sample Particulate Filter; VT TFE Zero/Span Valves And Timer.

[Federal Register: Vol 41, page 53684, 12/08/76]

**Monitor Labs/Lear Siegler Model 8810 Ozone Analyzer**

*Automated Equivalent Method: EQOA-0881-053*

"Monitor Labs or Lear Siegler Model 8810 Photometric Ozone Analyzer," operated on a range of either 0-0.5 or 0-1.0 ppm, with selectable electronic time constant settings from 20 through 150 seconds, with or without any of the following options: 05 Pressure Compensation; 06 Averaging Option; 07 Zero/Span Valves; 08 Internal Zero/Span (Valve And Ozone Source); 09 Status; 10 Particulate Filter; 15 through 20 DAS/REC Output.

[Federal Register: Vol 46, page 52224, 10/26/81]

**Monitor Labs/Lear Siegler Models ML9810, ML9811, or ML9812,**

*Automated Equivalent Method: EQOA-0193-091*

**Monitor Labs Model ML9810B, or Wedding & Associates Model 1010 Ozone Analyzers**

"Lear Siegler Measurement Controls Corporation Model ML9810 or Monitor Labs Models ML9810, ML9811, or ML9812, Monitor Labs Model 9810B, or Wedding & Associates, Inc. Model 1010 Ozone Analyzers," operated on any full scale range between 0-0.05 ppm<sup>1</sup> and 0-1.0 ppm, at any temperature in the range of 15°C to 35°C, with the service switch on the secondary panel set to the *In* position; with the following menu choices selected: Range: 0.05 ppm to 1.0 ppm; Over-ranging: Enabled or Disabled; Calibration: Manual or Timed; Diagnostic Mode: Operate; Filter Type: Kalman; Pres/Temp/Flow Comp: On; Span Comp: Disabled; and as follows: **Models ML9810, ML9811, and ML9812** - with a five-micron Teflon® filter element installed internally, with the 50-pin I/O board installed on the rear panel configured at any of the following output range settings: Voltage, 0.1 V, 1 V, 5 V, 10 V; Current, 0-20 mA, 2-20 mA, 4-20 mA; and with or without any of the following options: Valve Assembly for External Zero/Span (EZS); Rack Mount Assembly; Internal Floppy Disk Drive. **Models ML9810B and 1010** - with either a vendor-supplied or equivalent user-supplied five micron Teflon® filter and exhaust pump, and with or without any of the following options: Valve Assembly for External Zero/Span (EZS); Rack Mount Assembly; 50-pin I/O board; Internal Zero/Span Assembly (IZS); hinged, fold-down front panel.

[Federal Register: Vol 58, page 6964, 02/03/93]

**Opsis Model AR 500 and System 300 Open Path Ambient Air Monitoring Systems for Ozone**

*Automated Equivalent Method: EQOA-0495-103*

"Opsis Model AR 500 System" or "System 300" Open Path (long path) Ambient Air Monitoring Systems, configured for measuring O<sub>3</sub>, with one detector and moveable grating, operated with a measurement range of 0 to 0.5 ppm, an installed monitoring path length between 20 and 500 meters (or 20 and 1000 meters with the ER 150 option, AR 500 System only), xenon lamp type B (150 watt), fiber optic cable length between 3 to 20 meters; operating within an ambient air temperature range of -50 to +50°C, an analyzer temperature range of 20 to 30°C, a measurement (integrating) time setting between 30 and 120 seconds (0 min:30 sec. to 2 min:00 sec.), and with a complete cycle time of not more than 200 seconds (3 min, 20 sec.). Under this method designation, the Model AR 500 System or System 300 consists of: AR 500 opto-analyzer; emitter EM 110 and receiver RE 110 (together identified as ER 110); optic fibre cable OF60-S; power supply PS 150, OPSIS operational software, version 7.0 or 7.1; and initial on-site installation, setup, and limited operator training.<sup>2</sup>

**Optional components that can be used with the Model AR 500 only**, in addition to or as alternative to corresponding components listed above:

AR 503 opto-analyzer configured as Model AR 500 (only the

center detector active, sequential monitoring)

Emitter/receiver ER 150 (for monitoring path lengths up to

1 kilometer)

Transceiver ER 130 and Retroreflector RE 090 with:

7 prisms (max. monitoring path length 150 meters) or

12 prisms (max. monitoring path length 250 meters)

Receiver RE 130

Optic fibre cable OF60-R (low-loss for short wavelengths)

~~Multiplexers MEXC000 and MXM1024X~~ represents various cell

Dataloggers DL 010 and DL 016

Analogue and digital input/output cards AO 008, AI 016,

and DI 032

Analogue and digital isolation cards IA 008, ID 008,

OA 008, and OD 008,

Window heaters HF 110 and HF 150

Mirror heaters HM 110 and HM 150

Auto calibration unit CU 007

Software packages IO 80 (for the analogue and digital input/output adapters), DL10 and DL16 (for data loggers), ComVision, and STAT 500;

**Recommended calibration and accuracy audit components (or equivalent) for either Model AR 500 or System 300:**

Wavelength calibration lamp CA 004

Calibration bench CB 100

Receiver unit RE 060 (two required)

Calibration unit CA 150, with same type lamp as used in the monitoring path emitter

Power supply PS 150 for calibration unit CA 150

lengths from 1 to 900 mm

Special calibration cells CC 110 or CC 150 (for mounting directly on receiver)

Ozone generator OC 500

Light meter LM 010.

*Federal Register: Vol. 60, page 21518, 05/02/1995]*

**PCI Ozone Corporation Model LC-12 Ozone Analyzer**

*Automated Equivalent Method: EQOA-0382-055*

"PCI Ozone Corporation Model LC-12 Ozone Analyzer," operated on a range of 0-0.5 ppm.

*[Federal Register: Vol 47, page 13572, 03/31/82]*

**Philips PW9771 03 Analyzer**

*Automated Equivalent Method: EQOA-0777-023*

"Philips PW9771 03 Analyzer," consisting of the following components: PW9771/00 03 Monitor with PW9724/00 Disc.-Set; PW9750/00 Supply Cabinet; PW9750/20 Supply Unit operated on a range of 0-0.5 ppm, with or without any of the following accessories: PW9732/00 Sampler Line Heater; PW9750/30 Frame For MTT; PW9750/41 Control Clock 60 Hz; PW9733/00 Sampler; PW9752/00 Air Sampler Manifold.

*[Federal Register: Vol 42, page 38931, 08/01/77; Vol 42, page 57156, 11/01/77]*

**Teledyne - Advanced Pollution Instrumentation, Inc. Model 400E Ozone Analyzer**

*Automated Equivalent Method: EQOA-0992-087*

"Teledyne - Advanced Pollution Instrumentation, Inc. Model 400E or Advanced Pollution Instrumentation, Inc. Model 400 or 400A Ozone Analyzer," operated on any full scale range between 0-100 ppb<sup>1</sup> and 0-1000 ppb, with any range mode (Single, Dual, or AutoRange), at any ambient temperature in the range of 5°C to 40°C, and with a TFE filter. **Model 400E:** operated with a sample flow rate of 800 ±80 cm<sup>3</sup>/min (sea level), with the dilution factor set to 1, with Dynamic Zero ON or OFF, with Dynamic Span OFF, with Temp/Press compensation ON, and with or without any of the following options: Internal or external sample pump, Sample/Cal valve option, Internal Zero/Span (IZS), Rack mount with or without slides, 4-20 mA isolated current loop output.<sup>2</sup> **Models 400/400A:** operated with the dynamic zero and span adjustment feature (some Model 400 units only) set to OFF, and with or without any of the following options: Zero/Span Valve option, Internal Zero/Span (IZS) option, IZS ozone generator reference feedback option, standard

serial port or Multi-drop RS-232, digital status outputs, analog outputs: 100 mV, 1 V, 5 V, 10 V, 4-20 mA current loop, optional metal wool ozone scrubber, optional external sample pump, optional 47 mm diameter filter, optical bench heater, rack mount with slides.

[*Federal Register*: Vol 57, page 44565, 09/28/92; Vol 63, page 31992, 06/11/98; *Federal Register*: Vol 67, page 57811, 09/12/02]

**Thermo Electron/Thermo Environmental Instruments Models 49, 49C      Automated Equivalent Method: EQOA-0880-047**

"Thermo Electron or Thermo Environmental Instruments, Inc. Model 49 U.V. Photometric Ambient O<sub>3</sub> Analyzer" operated on a measurement range of either 0-0.5 or 0-1.0 ppm with or without any of the following options:

49-001 Teflon Particulate Filter; 49-002 19 Inch Rack Mount; 49-100 Internal Ozone Generator for Zero, Precision, and Level 1 Span Check; 49-103 Internal Ozone Generator for Zero, Precision, and Level 1 Span Checks With Remote Activation; 49-488 GPIB (General Purpose Interface Bus) IEEE-488

"Thermo Electron or Thermo Environmental Instruments, Inc. Model 49C U.V. Photometric Ambient O<sub>3</sub> Analyzer" operated on any measurement range between 0-0.05<sup>1</sup> to 1.0 ppm with any time average setting between 10 and 300 seconds, with the temperature and/or pressure compensation on or off, with or without any of the following options:<sup>2</sup>

100 Teflon particulate filter

420 Internal Zero Air Scrubber

200 Carrying Handle

610 4-20 mA current output

210Rack mounts

730 RS-232 Interface

340Internal Ozonator

780 RS-485 Interface

350Internal Ozonator with Remote I/O Activation

[*Federal Register*: Vol 45, page 57168, 08/27/80]

**NOTES**

<sup>1</sup> Users should be aware that designation of this analyzer for operation on ranges less than the range specified in the performance specifications for this analyzer (40 CFR 53, Subpart B) is based on meeting the same absolute performance specifications required for the specified range. Thus, designation of these lower ranges does not imply commensurably better performance than that obtained on the specified range.

<sup>2</sup> This analyzer is approved for use, with proper factory configuration, on either 50 or 60 Hertz line frequency and nominal power line voltages of 115 Vac and 230 Vac.

**Sources or Contacts for Designated Reference and Equivalent Methods**

ABB Process Analytics P.O. Box 831 Lewisburg, WV 24901 (304) 647-4358	Environics, Inc. 69 Industrial Park Rd. E. Tolland, CT 06084-2805 (203) 429-0077 <a href="http://www.environics.com">www.environics.com</a>	Rupprecht & Patashnick Co., Inc. 25 Corporate Circle Albany, NY 12203 (518) 452-0065 <a href="http://www.rpco.com">www.rpco.com</a>
Advanced Pollution Instrumentation, Inc. [Refer to Teledyne - Advanced Pollution Instrumentation, Inc.]	Graseby GMW [Refer to Andersen Instruments]	Sibata Scientific Technology, Ltd. 1-25, 3-chome Ikenohata, Taito-ku Tokyo 110, Japan 81-3(3822)2272 TTani@email.msn.com
Andersen Instruments 500 Technology Court Smyrna, GA 30082-9211 (800) 241-6898 <a href="http://www.anderseninstruments.com">www.anderseninstruments.com</a>	Horiba Instruments Incorporated 17671 Armstrong Avenue Irvine, CA 92714 (800) 446-7422 <a href="http://www.horiba.com">www.horiba.com</a>	Teledyne - Advanced Pollution Instrumentation, Inc. 6565 Nancy Ridge Drive San Diego, CA 92121-2251 (619) 657-9800 <a href="http://www.teledyne-api.com">www.teledyne-api.com</a>
ASARCO Incorporated 3422 South 700 West Salt Lake City, UT 84119 (801) 262-2459	Lear Siegler [Refer to Monitor Labs, Inc.]	Teledyne Analytical Instruments 16830 Chestnut Street City of Industry, CA 91748 (626) 934-1622
Beckman Instruments, Inc. Process Instruments Division 2500 Harbor Blvd. Fullerton, CA 92634 (714) 871-4848	Commonwealth of Massachusetts Department of Environmental Quality Engineering Tewksbury, MA 01876	Thermo Environmental Instruments, Inc. 8 West Forge Parkway Franklin, MA 02038 (508) 520-0430 <a href="http://www.thermoei.com">www.thermoei.com</a>
Bendix [Refer to ABB Process Analytics]	Met One Instruments, Inc. 1600 Washington Blvd. Grants Pass, OR 97526 (541) 471-7111 <a href="http://www.metone.com">www.metone.com</a> (metone@metone.com)	Tisch Environmental, Inc. 145 S. Miami Avenue Village of Cleves, OH 45002 (513) 467-9000 <a href="http://www.tisch-env.com">www.tisch-env.com</a>
BGI Incorporated 58 Guinan Street Waltham, MA 02451 (781) 891-9380 <a href="http://www.bgiusa.com">www.bgiusa.com</a> (bgiinc@attglobal.net)	McMillan [Refer to Columbia Scientific Industries]	URG Corporation 116 Merritt Mill Road Chapel Hill, NC 27516 (919) 942-2753
Columbia Scientific Industries 11950 Jollyville Road Austin, TX 78759 (800) 531-5003	Mine Safety Appliances 600 Penn Center Blvd. Pittsburgh, PA 15235-5810 (412) 273-5101	U.S. EPA National Exposure Research Laboratory Human Exposure & Atmospheric Sciences Division (MD-46) Research Triangle Park, NC 27711 (919) 541-2622 <a href="http://www.epa.gov/heads">www.epa.gov/heads</a>
Combustion Engineering [Refer to ABB Process Analytics]	Monitor Labs, Inc. 74 Inverness Drive Englewood, CO 80112-5189 (800) 422-1499 <a href="http://www.monitorlabs.com">www.monitorlabs.com</a>	Wedding and Associates, Inc. [Refer to Thermo Environmental Instruments, Inc.]
Dasibi Environmental Corp. 506 Paula Avenue Glendale, CA 91201 (818) 247-7601 <a href="http://www.dasibi.com">www.dasibi.com</a>	Opsis AB, Furulund, Sweden Instruments also available from: Opsis, Inc. 146-148 Sound Beach Avenue Old Greenwich, CT 06870 (203) 698-1810 <a href="http://www.opsis.se">www.opsis.se</a>	
DKK-TOA Corporation 29-10, 1-Chome, Takadanobaba, Shinjuku-ku Tokyo 169-8648, Japan <a href="http://www.toadkk.co.jp">www.toadkk.co.jp</a>	State of Oregon Department of Environmental Quality Air Quality Division 811 S.W. Sixth Avenue Portland, OR 97204	
Environnement S.A 111, bd Robespierre 78300 Poissy, France <a href="http://www.environnement-sa.com">www.environnement-sa.com</a> Instruments also available from: Altech/Environnement U.S.A. 2623 Kaneville Court Geneva, IL 60134 (630) 262-4400 rbrown@altechusa.com	PCI Ozone Corp. One Fairfield Crescent West Caldwell, NJ 07006 (201) 575-7052 <a href="http://www pci-wedeco.com">www pci-wedeco.com</a>	Phillips Electronic Instruments, Inc. 85 McKee Drive Mahwah, NJ 07430

**U.S. EPA REFERENCE & EQUIVALENT METHODS FOR AMBIENT AIR**

<u>Method</u>	<u>Designation Number</u>	<u>Method Code</u>	<u>Method</u>	<u>Designation Number</u>	<u>Method Code</u>
<b><u>SO<sub>2</sub> Manual Methods</u></b>					
Reference method (pararosaniline)	--	097	Environmental Instruments 49, 49C	EQOA-0880-047	047
Technicon I (pararosaniline)	EQS-0775-001	097			
Technicon II (pararosaniline)	EQS-0775-002	097			
<b><u>SO<sub>2</sub> Analyzers</u></b>					
Advanced Pollution Instr. 100	EQSA-0990-077	077			
Advanced Pollution Instr. 100A/100AS	EQSA-0495-100	100			
Asarco 500	EQSA-0877-024	024	<b><u>CO Analyzers</u></b>		
Beckman 953	EQSA-0678-029	029	Beckman 866	RFCA-0876-012	012
Bendix 8303	EQSA-1078-030	030	Bendix 8501-5CA	RFCA-0276-008	008
Columbia Scientific Industries 5700	EQSA-0494-095	095	Dasibi 3003	RFCA-0381-051	051
Dasibi 4108	EQSA-1086-061	061	Dasibi 3008	RFCA-0488-067	067
DKK-TOA Corp. Model GFS-32	EQSA-0701-115	115	Environnement S.A CO11M	RFCA-0995-108	108
DKK-TOA Corp. Model GFS-112E	EQSA-0100-133	133	Environnement S.A CO12M	FRCA-0206-147	147
Environnement S.A AF21M	EQSA-0292-084	084	Horiba AQM-10, -11, -12	RFCA-1278-033	033
Environnement S.A AF22M	EQSA-0802-149	149	Horiba 300E/300SE	RFCA-1180-048	048
Environnement S.A. SANOA	EQSA-0400-138	138	Horiba APMA-360	RFCA-0895-106	106
Horiba Model APSA-360/APSA-360ACE	EQSA-0197-114	114	Lear Siegler or Monitor Labs ML9830, Monitor Labs ML9830B, Wedding 1020	RFCA-0992-088	088
Lear Siegler AM2020	EQSA-1280-049	049	MASS - CO 1 (Massachusetts)	RFCA-1280-050	050
Lear Siegler SM1000	EQSA-1275-005	005	Monitor Labs 8310	RFCA-0979-041	041
Lear Siegler or Monitor Labs ML9850, Monitor Labs ML9850B, Wedding 1040	EQSA-0193-092	092	Monitor Labs or Lear Siegler 8830	RFCA-0388-066	066
Meloy SA185-2A	EQSA-1275-006	006	Monitor Labs ML9830/9830B, Wedding 1020	RFCA-0992-088	088
Meloy SA285E	EQSA-1078-032	032	MSA 202S	RFCA-0177-018	018
Meloy SA700	EQSA-0580-046	046	Teledyne Advanced Pollution Instr. 300 or 300E	RFCA-1093-093	093
Monitor Labs 8450	EQSA-0876-013	513	Thermo Electron or Thermo Environmental Instruments 48, 48C	RFCA-0981-054	054
Monitor Labs or Lear Siegler 8850	EQSA-0779-039	039			
Monitor Labs or Lear Siegler 8850S	EQSA-0390-075	075			
Monitor Labs ML9850/9850B, Wedding 1040	EQSA-0193-092	092			
Opsis AR 500, System 300 (open path)	EQSA-0495-101	101			
Philips PW9700	EQSA-0876-011	511			
Philips PW9755	EQSA-0676-010	010			
Teledyne Analytical Instruments 6400A	EQSA-0495-100	100			
Thermo Electron 43	EQSA-0276-009	009			
Thermo Electron 43A or Thermo Environmental Instruments 43B, 43C	EQSA-0486-060	060			
<b><u>O<sub>3</sub> Analyzers</u></b>					
Advanced Pollution Instr. 400/400A/400E	EQOA-0992-087	087			
Beckman 950A	RFOA-0577-020	020			
Bendix 8002	RFOA-0176-007	007			
Columbia Scientific Industries 2000	RFOA-0279-036	036			
Dasibi 1003-AH, -PC, -RS	EQOA-0577-019	019			
Dasibi 1008-AH, -PC, -RS	EQOA-0383-056	056			
DKK-TOA Corp. Model GUX-113E	EQOA-0200-134	134			
Envionics 300	EQOA-0990-078	078			
Environnement S.A O <sub>3</sub> 41M	EQOA-0895-105	105			
Environnement S.A O <sub>3</sub> 42M	EQOA-0206-148	148			
Environnement S.A SANOA	EQOA-0400-137	137			
Horiba APOA-360	EQOA-0196-112	112			
Lear Siegler or Monitor Labs ML9810, Monitor Labs ML9810B, Wedding 1010	EQOA-0193-091	091			
McMillan 1100-1	RFOA-1076-014	514			
McMillan 1100-2	RFOA-1076-015	515			
McMillan 1100-3	RFOA-1076-016	016			
Meloy OA325-2R	RFOA-1075-003	003			
Meloy OA350-2R	RFOA-1075-004	004			
Monitor Labs 8410E	RFOA-1176-017	017			
Monitor Labs or Lear Siegler 8810	EQOA-0881-053	053			
Monitor Labs ML9810/9810B, Wedding 1010	EQOA-0193-091	091			
Opsis AR 500, System 300 (open path)	EQOA-0495-103	103			
PCI Ozone Corp. LC-12	EQOA-0382-055	055			
Philips PW9771	EQOA-0777-023	023			
Teledyne - Advanced Pollution Instr. 400E	EQOA-0992-087	087			
Thermo Electron or Thermo					
<b><u>Pb Manual Methods</u></b>					
Reference method (hi-vol/AA spect.)	--				
Hi-vol/AA spect. (alt. extr.)	EQL-0380-043	043			
Hi-vol/Energy-disp XRF (TX ACB)	EQL-0783-058	058			
Hi-vol/Energy-disp XRF (NEA)	EQL-0589-072	072			
Hi-vol/Flameless AA (EMSL/EPA)	EQL-0380-044	044			
Hi-vol/Flameless AA (Houston)	EQL-0895-107	107			
Hi-vol/Flameless AA (Omaha)	EQL-0785-059	059			
Hi-vol/ICAP spect. (Doe Run Co.)	EQL-0196-113	113			
Hi-vol/ICAP spect. (EMSL/EPA)	EQL-0380-045	045			

**U.S. EPA REFERENCE & EQUIVALENT METHODS FOR AMBIENT AIR**

<u>Method</u>	<u>Designation Number</u>	<u>Method Code</u>	<u>Method</u>	<u>Designation Number</u>	<u>Method Code</u>
Hi-vol/ICAP spect. (Illinois)	EQL-1193-094	094			
Hi-vol/ICAP spect. (Kansas)	EQL-0592-085	085			
Hi-vol/ICAP spect. (Montana)	EQL-0483-057	057			
Hi-vol/ICAP spect. (NE&T)	EQL-1188-069	069			
Hi-vol/ICAP spect. (New Hampshire)	EQL-1290-080	080			
Hi-vol/ICAP spect. (Pennsylvania)	EQL-0592-086	086			
Hi-vol/ICAP spect. (Pima Co.,AZ)	EQL-0995-109	109			
Hi-vol/ICAP spect. (Pima Co.,AZ)	EQL-0995-110	110			
Hi-vol/ICAP spect. (Rhode Island)	EQL-0888-068	068			
Hi-vol/ICAP spect. (Silver Val. Labs)	EQL-1288-070	070			
Hi-vol/ICAP spect. (TNRCC)	EQL-0400-140	140			
Hi-vol/ICAP spect. (West Virginia)	EQL-0694-096	096			
Hi-vol/WL-disp. XRF (CA A&IHL)	EQL-0581-052	052			
<b>PM<sub>10</sub> Samplers</b>					
Andersen Instruments RAAS10-100	RFPS-0699-130	130			
Andersen Instruments RAAS10-200	RFPS-0699-131	131			
Andersen Instruments RAAS10-300	RFPS-0699-132	132			
BGI Model PQ100	RFPS-1298-124	124			
BGI Model PQ200	RFPS-1298-125	125			
Oregon DEQ Medium volume sampler	RFPS-0389-071	071			
Rupprecht & Patashnick Partisol 2000	RFPS-0694-098	098			
R & P Partisol-FRM Model 2000	RFPS-1298-126	126			
R & P Partisol-Plus Model 2025 Seq.	RFPS-1298-127	127			
<b>PM<sub>10</sub> Samplers (continued)</b>					
Sierra-Andersen/GMW 1200	RFPS-1287-063	063			
Sierra-Andersen/GMW 321-B	RFPS-1287-064	064			
Sierra-Andersen/GMW 321-C	RFPS-1287-065	065			
Sierra-Andersen/GMW 241 Dichot.	RFPS-0789-073	073			
Tisch Environmental Model TE-6070	RFPS-0202-141	141			
W&A/Thermo Electron Mod 600 HVL	RFPS-1087-062	062			
<b>PM<sub>10</sub> Analyzers</b>					
Andersen Instruments Beta FH62I-N	EQPM-0990-076	076			
Met One BAM1020, GBAM1020, BAM1020-1, GBAM1020-1	EQPM-0798-122	122			
R & P TEOM 1400, 1400a	EQPM-1090-079	079			
W&A/Thermo Electron 650 Beta Gauge	EQPM-0391-081	081			
<b>PM<sub>2.5</sub> Samplers</b>					
Andersen Model RAAS2.5-200 Audit	RFPS-0299-128	128			
BGI PQ200/200A	RFPS-0498-116	116			
BGI PQ200-VSCC or PQ200A-VSCC	EQPM-0202-142	142			
Graseby Andersen RAAS2.5-100	RFPS-0598-119	119			
Graseby Andersen RAAS2.5-300	RFPS-0598-120	120			
R & P Partisol-FRM 2000 PM-2.5	RFPS-0498-117	117			
R & P Partisol-FRM 2000 PM-2.5 FEM	EQPM-0202-143	143			
R & P Partisol 2000 PM-2.5 Audit	RFPS-0499-129	129			
R & P Partisol 2000 PM-2.5 FEM Audit	EQPM-0202-144	144			
R & P Partisol-Plus 2025 PM-2.5 Seq.	RFPS-0498-118	118			
R & P Partisol-Plus 2025 PM-2.5 FEM Seq.	EQPM-0202-145	145			
Thermo Environmental Model 605 CAPS	RFPS-1098-123	123			
URG-MASS100	RFPS-0400-135	135			
URG-MASS300	RFPS-0400-136	136			
<b>TSP Manual Method</b>					
Reference method (high-volume)	--	802			